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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/552,710	04/19/2000	Dimitar P. Filev	199-0287	3156

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EXAMINER
BARNES, CRYSTAL J

ART UNIT	PAPER NUMBER
2121	

DATE MAILED: 09/25/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application N .	Applicant(s)	
	09/552,710	FILEV ET AL.	
	Examiner	Art Unit	
	Crystal J. Barnes	2121	

-- The MAILING DATE of this communication appears on the cov r sheet with the corresp ndence address --

Period f r Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 April 2000* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disp sition of Claims

4)☒ Claim(s) *1-12* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-12* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 May 2000* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *2,4,5* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities:

reference number "38" has been changed to "40" on page 6 line 8.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 4, 5, 8 and 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over USPN 6,226,568 to Tong et al.

As per claim 1 wherein a portable advisory system for balancing airflows in a paint booth comprising a portable airflow sensor [low air flow sensors 52] to measure airflows [air flows] in the paint booth [paint booth] and a portable computer [microprocessor 53, operator interface] connected to said sensor for collecting data from said airflow sensor and guiding an operator through a process

of adjusting multiple fan speeds [adjustable speed exhaust fan] and duct dampers [cross flow damper] to achieve desired airflows; the Tong et al. reference discloses low air flow sensors 52 may be used adjacent each cross-flow damper 50, the sensor providing accuracy in signaling air flow direction and air flow velocity (see column 4 lines 61-65). Digital output of the sensors is sent to a microprocessor 53 that in turn converts the information for use by a programmable logic controller that adjusts the cross-flow dampers and venturi gap width (see columns 4-5 lines 66-2).

As per claims 4 and 5 wherein said computer is a laptop or a palmtop computer [operator interface], the Tong et al. reference discloses an operator interface with the controller can be attained through use of a desktop terminal personal computer 55 or through a remote terminal unit (see column 5 lines 3-5).

As per claim 8 wherein a method of balancing airflows in a paint booth comprising the steps of providing a portable airflow sensor [low air flow sensors 52] to measure airflows [air flows] in the paint booth [paint booth], providing a portable computer [microprocessor 53] and connecting the portable computer to the air flow sensor [operator interface], measuring the velocity [air supply velocity, cross-flow velocities] of the airflows in the paint booth with the airflow sensor and

storing the measured airflows in a database, and updating a sensitivity model (J) [Jacobean Sensitivity Matrix] of the paint booth with the measured velocity of the airflows to balance the airflows in the paint booth; the Tong et al. reference discloses a method of rapidly balancing air flows in a complex paint spray booth (see Abstract). The air is forced by such fans first through the ducts 21 which may contain dampers 22 to effect control of the main airflow (see column 3 lines 40-42). To provide a more precise determination of the supply fan or damper settings, a Jacobean Sensitivity Matrix may be used to define the responses of each of the cross flow velocities to a change in one of the independent parameters (see column 8 lines 6-9). Also see rejection of claim 1.

As per claim 10 wherein said step of updating includes computing a mean squared error [minimized RMS error] with the sensitivity model (J), the Tong et al. reference discloses a constrained optimization problem is solved to determine a feasible set of cross flow velocities (see column 7 lines 48-55). Once the Sensitivity Matrix is determined, adjustments tot e independent variables are calculated by minimizing the error function (see column 8 lines 16-20).

As per claim 11 wherein a method including the step of updating new inputs and current sensitivity model in a first database, the Tong et al. reference

discloses the Jacobean is first defined by systematically perturbing the system and measuring the responses carried each time the system independent parameters are changed; the Jacobean is updated using the Broyden method. By continuously updating the Jacobean, the controller always has the knowledge of the true response of the system or facility. (See column 8 lines 10-16.)

As per claim 12 wherein a method including the step of calculating a rate of learning, the Tong et al. reference discloses the essential aspect of this first phase is to rapidly set the proper exhaust volume flow rate and scrubber pressure drop at the venturi slot by varying the width (see figure 4 and column 5 lines 46-52). In most cases, the points t and t' should be reasonably close to each other, measured values being within 10% of target values (see figure 5 and columns 6-7 lines 58-13).

The Tong et al. reference does not expressly disclose a portable airflow sensor and a portable computer.

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to make the sensor and/or the computer taught by the Tong et al. reference portable. (See *In re Lindberg*, 194 F.2d 732, 735, 93 USPQ 23, 26.)

One of ordinary skill in the art would have been motivated to make the sensor and/or the computer portable so that it could be carried and moved with ease to other systems requiring airflow balancing.

4. Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over USPN 6,226,568 to Tong et al. as applied to claims 1, 4, 5, 8 and 10-12 above, and further in view of USPN 5,341,988 to Rein et al.

As per claim 6 wherein said computer includes a flexible setup dialog [setup tool 320], the Tong et al. reference does not expressly disclose a flexible setup dialog.

As per claim 7 wherein said computer includes an algorithm [Sensitivity Matrix] communicating with a plurality of databases and a flexible setup dialog [setup tool], the Tong et al. reference does not expressly disclose a flexible setup dialog.

The Rein et al. discloses the controllers 68 receives their initial and subsequent programming and commands from either a building automation system 76, a coordinating controller 102 or a setup tool 320 by means of the first communication medium TX1 (see column 24 lines 26-30). The setup tool 320 uses a

non-physical link to provide programming, information or commands to any particular controller 68 by means of the central receiver 66 (see figures 19, 20 and column 24 lines 31-36). The setup tool 320 can also, or alternatively, be provided with a wired connector such as electrical plug 324 capable of operatively interfacing with a mating connection 316 on a zone sensor 58 of a personal comfort sensor 110 (see column 24 lines 41-53). The setup tool 320 typically includes a housing 328 containing a microprocessor controller 330, and output device 332, a wired connector 324 or an infrared transmitter 326, a keyboard 336, a display 338 and a generic sensor input 104H (see column 24 lines 54-66).

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to modify the operator interface taught by the Tong et al. reference with the setup tool taught by the Rein et al. reference.

One of ordinary skill in the art would have been motivated to modify the method of balancing paint booth airflows to provide a setup tool for programming components of a wireless communications system (see Rein et al. column 3 lines 41-57).

5. Claims 1-3, 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over USPN 6,146,264 to Tong et al.

As per claim 1 wherein a portable advisory system for balancing airflows in a paint booth comprising a portable airflow sensor [flow velocity sensors 60, flow measurement sensor assembly 60] to measure airflows [flow velocity, air velocity] in the paint booth [paint booth] and a portable computer [computer 88] connected to said sensor for collecting data from said airflow sensor and guiding an operator through a process of adjusting multiple fan speeds [fans 34-39] and duct dampers [dampers 50] to achieve desired airflows; the Tong et al. reference discloses an airflow control system for a paint booth (see column 1 lines 6-8). The airflow control system includes sensors for measuring down flow velocity in each affected chamber, and also the cross flow velocity between contiguous chambers. Signals generated by the velocity measurement sensors are applied to control motors used on air supply fans and dampers that determine the down flow velocity values in the contiguous chambers. (See column 1 lines 59-65.) The velocity of the down flowing air in any given treatment chamber is varied or controlled by the associated air supply fan alone or by the fan in combination with the associated motorized damper 50 (see column 5 lines 5-10). The sensor assembly is mounted and oriented to

measure flow velocity direction and in the horizontal direction (see column 5 lines 16-20). The electrical signals generated by the various anemometers are suitably applied to the air supply fan motors and damper motors to maintain the desired down flow velocity and cross flow velocity (see figure 1 and column 6 lines 11-16).

As per claim 2 wherein said computer includes a database [memory map 79] of optimal control settings for storing information of last optimal commands and last optimal sensitivity model; the Tong et al. reference discloses an airflow control algorithm provides a base against which the sensed velocity values are compared to provide a desired airflow balance (see column 2 lines 1-4). There is a collection of the response sensitivities i.e., the anemometer change resulting from change in fan speed or damper position (see column 6 lines 28-31). The system uses algorithms to determine the best set of fan speeds and damper positions that will make the anemometer readings as close to the target values as possible (see column 6 lines 31-36). The computer further comprises a programmable logic control 78, memory map 79, monitoring screen 82, and keyboard 80. The programmable logic control receives signals from sensors 60 and delivers control signals to the fan motors and damper motors. Logic control 78 can be controlled by coprocessor 76 or keyboard

80 (see figure 3 and column 7 lines 7-13). The PLC 78 and coprocessor share data in the memory map 79 (see column 7 lines 15-19).

As per claim 3 wherein said computer includes a database for storing information of air velocities and VFD/damper commands; the Tong et al. reference discloses the number of variables is so great that the control functions have to be carried out with a computer using an algorithm that takes account of the effect of fan speed changes and damper motor position changes on conditions throughout the system (see column 6 lines 16-20). When the system makes a change to either a fan speed or damper position, the system keeps track of how much each anemometer reading changes as a result of the fan speed change or damper position changes (see column 6 lines 25-28). Typically the fan motor speed will be varied by a variable frequency drive that can include a silicon-controlled rectifier connected to a variable value control trigger circuit (see column 3 lines 20-22).

As per claim 8 wherein a method of balancing airflows in a paint booth comprising the steps of providing a portable airflow sensor to measure airflows in the paint booth [flow measurement sensor assembly 60], providing a portable computer [computer 88] and connecting the portable computer to the air flow sensor, measuring the velocity of the airflows in the paint booth with the airflow

sensor and storing the measured airflows in a database, and updating a sensitivity model (J) [collection of the response sensitivities] of the paint booth with the measured velocity of the airflows to balance the airflows in the paint booth; see rejection of claim 1.

As per claim 9 wherein a method including the step of updating on-line the VFD and damper settings; the Tong et al reference discloses the system can operate in four different modes, i.e. automatically by coprocessor 76, manually via keyboard 80, jointly such that coprocessor 76 makes recommended decisions that the human operator can override, or semi-manually wherein control is switched from time to time between manual control and automatic control (see figure 3 and column 7 lines 26-31). Manual control is a desirable option should the automatic system fail to provide the desired airflow balance, e.g. during a fan failure (see column 7 lines 18-20). The control action is more precise and predictable when a computer having an operator algorithm is used to determine the corrective signals applied to the fan motors and damper motors (see column 7 lines 35-38).

The Tong et al. reference does not expressly disclose a portable airflow sensor and a portable computer.

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to make the sensor and/or the computer portable. (See *In re Lindberg*, 194 F.2d 732, 735, 93 USPQ 23, 26.)

One of ordinary skill in the art would have been motivated to make the sensor and/or the computer portable so that it could be carried and moved with ease to other systems requiring airflow balancing.

6. Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over USPN 6,146,264 to Tong et al. as applied to claims 1-3, 8 and 9 above, and further in view of USPN 5,341,988 to Rein et al.

As per claim 6 wherein said computer includes a flexible setup dialog [setup tool 320], the Tong et al. reference does not expressly disclose a flexible setup dialog.

As per claim 7 wherein said computer includes an algorithm [algorithm] communicating with a plurality of databases [memory map] and a flexible setup dialog [setup tool], the Tong et al. reference does not expressly disclose a flexible setup dialog.

The Rein et al. discloses the controllers 68 receives their initial and subsequent programming and commands from either a building automation system 76, a coordinating controller 102 or a setup tool 320 by means of the first communication medium TX1 (see column 24 lines 26-30). The setup tool 320 uses a non-physical link to provide programming, information or commands to any particular controller 68 by means of the central receiver 66 (see figures 19, 20 and column 24 lines 31-36). The setup tool 320 can also, or alternatively, be provided with a wired connector such as electrical plug 324 capable of operatively interfacing with a mating connection 316 on a zone sensor 58 of a personal comfort sensor 110 (see column 24 lines 41-53). The setup tool 320 typically includes a housing 328 containing a microprocessor controller 330, and output device 332, a wired connector 324 or an infrared transmitter 326, a keyboard 336, a display 338 and a generic sensor input 104H (see column 24 lines 54-66).

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to modify the computer taught by the Tong et al. reference with the setup tool taught by the Rein et al. reference.

One of ordinary skill in the art would have been motivated to modify the paint booth airflow control system to provide a setup tool for programming

components of a wireless communications system (see Rein et al. column 3 lines 41-57).

7. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over USPN 5,643,077 to Ayer.

As per claim 1 wherein a portable advisory system for balancing airflows in a paint booth comprising a portable airflow sensor [monitor 19] to measure airflows [air flow, flow rate] in the paint booth [paint spray booth enclosure] and a portable computer [central controller 22] connected to said sensor for collecting data from said airflow sensor and guiding an operator through a process of adjusting multiple fan speeds [VFD fans, fixed fans] and duct dampers [adjustable dampers] to achieve desired airflows; the Ayer reference discloses air flow is varied in recirculation and exhaust ducts through the use of variable frequency drive fans (or fixed fans with dampers or equivalent), which are centrally controlled (see column 3 lines 46-49). The integrated assembly is comprised of a monitor, control unit, variable airflow system, and a water curtain particulate filtration system (see figure 1 and column 4 lines 20-23). A monitor 19 that measures concentrations in the recirculation duct 16 upstream of where the fresh air makeup air 17 is

introduced continuously analyzes the concentration in the recirculation stream 20. The output from the monitor 19 is sent to the central controller 22 via electric interface, fiber optic cable, or equivalent 21. The central controller 22 controls the recirculation flow rate the fresh makeup air intake damper 23 and the recirculation damper 24 and controls the exhaust flow rate via the exhaust fan system 25. The central controller 22 adjusts the fresh makeup air intake damper 23, the recirculation duct damper 24, and the exhaust fan system 25 to maintain a constant volume flow rate through the paint booth enclosure 10 (see figure 1 and columns 4-5 lines 61-8).

The Ayer reference does not expressly disclose a portable airflow sensor and a portable computer.

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to make the sensor and/or the computer portable. (See *In re Lindberg*, 194 F.2d 732, 735, 93 USPQ 23, 26.)

One of ordinary skill in the art would have been motivated to make the sensor and/or the computer portable so that it could be carried and moved with ease to other systems requiring airflow balancing.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The following patents are cited to further show the state of the art with respect to airflow control systems in paint spray booths:

USPN 5,820,459 to Nelson

USPN 5,480,349 to Kolta

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Crystal J. Barnes whose telephone number is 703.306.5448. The examiner can normally be reached on Monday-Friday alternate Mondays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas G. Black can be reached on 703.305.9707. The fax phone numbers for the organization where this application or proceeding is assigned are 703.746.7239 for regular communications and 703.746.7238 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703.305.3900.

cjb
September 18, 2002

THOMAS BLACK
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100